

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P-TARK-012WO	FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/EP2004/051286	International filing date (day/month/year) 29.06.2004	Priority date (day/month/year) 02.07.2003
International Patent Classification (IPC) or national classification and IPC D06N3/08, D06N7/00, B29C59/04, B29C59/16, B32B31/00, B32B3/30, B32B5/20, B32B27/12		
Applicant TARKETT SAS et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 8 sheets, as follows:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application 		
Date of submission of the demand 29.11.2004	Date of completion of this report 16.08.2005	
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Kanetakis, I Telephone No. +49 89 2399-8083	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/051286

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1, 4, 7-9, 12-17	as originally filed
2, 3, 5, 6, 10, 11	received on 06.06.2005 with letter of 02.06.2005

Claims, Numbers

9-25	as originally filed
1-8	received on 06.06.2005 with letter of 02.06.2005

Drawings, Sheets

1/2, 2/2	as originally filed
----------	---------------------

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):
4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - the description, pages
 - the claims, Nos. 1
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/051286

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-25
	No: Claims	
Inventive step (IS)	Yes: Claims	1-25
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item I

Basis of the report

- 1 There is no unambiguous support for the fact that the first coating is **optionally** gelled in step f according to claim 1 (emphasis added). In claim 1 and in the description as originally filed, the first coating was gelled in step e. See also p. 4, l. 2 "The coatings are then gelled...". As a matter of fact there is an inconsistency between Fig. 1 and the description on p. 4, l. 2. In Fig 1 gelling of the curable coating (the second coating) is disclosed and nothing is mentioned as to the gelling of the non-curable coating (the first coating). The application lacks clarity in this respect (see also item VIII).

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 2 Reference is made to the following documents:
D1: US-A-4 491 616 (SCHMIDLE CLAUDE J ET AL) 1 January 1985 (1985-01-01)
D2: US-A-4 608 294 (COURTOY JEAN-FRANCOIS ET AL) 26 August 1986 (1986-08-26)
D3: US-A-4 298 646 (HAEMER LAURENCE F ET AL) 3 November 1981 (1981-11-03)
D4: US 2001/002293 A1 (BURNS ALONZO M ET AL) 31 May 2001 (2001-05-31)
D5: WO 03/057458 A (DOMCO TARKETT INC) 17 July 2003 (2003-07-17)
- 3 Novelty (Art. 33(2) PCT)
The subject-matter of claim 1 (method), claim 21 (product) and claim 22 (product) is novel over any one of documents D1-D4. In particular, a surface covering comprising a non-curable coating is not disclosed in D1.
- 4 Inventive step (Art. 33(3) PCT)
- 4.1 Document D1 is considered to represent the most relevant state of the art because it provides most of the technical effects of the application, see D1: col. 1, l. 54-65. The object of D1 is to provide a sheet material having selective, surface decorative effects

created by the controlled placement of various different surface finishes, embossings or surface gloss differentials, using methods in which registration problems are eliminated and which methods are neither costly nor process-time consuming.

D1 relates to resinous embossed sheets with contrasting gloss and dull areas for wall covering. The process comprises (A) selectively applying a photoinitiator (I) to a base layer in areas where a dull appearance is required; (B) applying an overall wear layer of a resinous composition (II) uniformly containing a curable monomer (III), heating to gel and provide a dull overall appearance without curing (III); (C) subjecting the gelled wear layer to actinic radiation to selectively cure and harden (III) over the areas where (I) is applied, permanently securing a dull appearance in those areas; and (D) providing thermal energy to convert uncured (III) from a dull to a glossy appearance in a cured and hardened state. Preferably the base layer is a foamable resinous compsn. containing a blowing agent which is heat-decomposed in step (D) to form a foam layer, and it may be selectively overprinted with a composition containing a compound (IV) which inhibits the action of the blowing such that, after step (D), the areas beneath the printed composition comprise a foam layer of lower thickness: (I) may be in the composition which also contains (IV), and (I) is especially thioxanthone. Composition (II) is PVC and (III) is trimethylolpropane trimethacrylate. The products are useful as upholstery, in apparel manufacturing, and in covers for walls or floors.

4.2 The subject-matter of present independent claims 1, 21 and 22 differs in that a non-curable coating is absent in D1. As to the process claim 1, an additional difference is that the step of mechanical embossing (step g) is not specified to be performed between steps f and h. The problem to be solved by the present invention may therefore be regarded as to provide an alternative surface covering to that of D1. The solution proposed in claims 1, 21 and 22 of the present application involves an inventive step for the following reasons:

Although a non-curable coating is described in D3 (=US-A-4298646) as the resinous wear layer 16 (column 6, l. 15-40), D3 does not disclose the use of a photoinitiators, hence the curing process and the surface texture are different. Apparently the combination of all these features cannot be derived from either D1 or D3 alone, or

from a combination of D1 and D3.

4.3 Dependent claims 2-20, 23-25 also meet the requirements of the PCT in respect of novelty and inventive step.

Re Item VIII

Certain observations on the international application

- 5 It is not clear which of the coatings is gelled, because the application documents as originally filed are not consistent (see also item I).
- 6 The following clarity objections (Art. 6 PCT) have not been attended:

The passage on p. 3, l. 17-23 is not in conformity with the claims, since the printing inks according to the claims are not applied directly onto the substrate, but to the surface of the gelled plastic layer. This embodiment has not been deleted.

P-TARKETT-012/WO

2.

printing and other techniques for years in order to obtain design effects and textures which meet consumer demands. In U.S. Patent No. RE. 33,599 a process is described for obtaining selective matting on synthetic coverings by depositing on an expandable or nonexpandable support substrate (1) a polymer coating which

5 contains at least one first polymerization initiator onto at least a first selected zone and (2) at least one second coating comprised of a crosslinkable monomer which contains at least one second polymerization initiator onto at least a second selected zone. The second zone may encompass at least a portion of the first zone. The first and second initiators are triggered by distinct "spectral zones". Following pre-gelling,

10 an overall graining operation is carried out over at least a portion of the surface followed by curing the first selected zone and thereby fixing the graining thereon. Then gelling is carried out to cause the graining in the second zone to smooth out. The product has a selectively matted appearance. Other methods of making differential gloss products are described in U.S. Patent No. 4,298,646 and U.S. Patent No.

15 4,491,616.

The surface texture effects of the present invention are obtained by creating relatively deep emboss depths as compared with the shallow graining or dusting techniques employed to obtain the matted or differential gloss effects of the patents noted above. More specifically, the present invention is directed to the

20 realistic imitation in surface coverings not only of the surface texture of a variety of masonry materials such as ceramic tile, stone, brick, sandstone, cork; wood and combinations thereof, but also in some embodiments to the realistic imitation of the surface texture of the grout or mortar in the joints between such materials.

SUMMARY OF THE INVENTION

In accordance with the present invention, a novel process is provided for

25 obtaining selective areas of distinctive appearance, e.g., textured grout lines, on the surface of a synthetic surface covering.

Accordingly the invention provides a new and improved method of making a surface covering as claimed in claim 1.

In the method according to the invention at least a portion (preferably

30 the whole portion) of said first photoinitiator used in step (c) migrates into the

gelled plastic layer and into the curable coating during and after step (e). In step (g) the softened curable coating is mechanically embossed overall with a specific structure such as that imitating grout. In step (h) said first photoinitiator is activated in an enclosure by means of an appropriate electromagnetic wave or light (for example UV light) so as to cure the curable coating in those areas overlying said printing ink. Upon exiting the activating enclosure, the product enters a fusion oven in step (i) wherein that portion of the curable coating, which does not overlie said printing ink and has thus not been cured, smoothes out such that the grout imitating texture disappears in those areas. The surface of the curable coating which has smoothed out may then optionally be mechanically embossed a second time but now with a structure which imitates for example the texture of stone, wood or the like. Thereafter, the product enters a second activating enclosure in step (k) where the curable coating in at least those unprinted areas thereof is cured by appropriate means (for example by electron beam irradiation) so as to cure the curable coating in those unprinted areas, i.e. those areas which do not overlie said printing ink.

Printing inks without inhibitors may also be printed in a pattern or design directly onto a substrate, which does not have a foamable plastic layer. The resultant product has a flat surface with different textures or appearances including, in some instances, a three-dimensional appearance. In this embodiment, should textured grout lines be part of the pattern or design, the textured grout lines will be flush with the top surface of the product, i.e. without relief.

In a further preferred embodiment, to obtain such a product, a foamable plastic layer containing a foaming agent is applied over a sheet substrate. The combination is then heated to gel the plastic layer without activating the foaming agent. A first printing ink containing a photoinitiator and an expansion inhibitor is then applied in a first pattern on the gelled plastic layer, whereupon a portion of the inhibitor migrates into the gelled plastic layer. Following the printing steps, a first, non-curable coating made from a plastisol or organosol is applied over the entire surface of the gelled plastic layer, including the first and optionally second printing inks. After this, a second, curable coating is applied over the first non-curable

sheets can be employed in place of the foamable and/or curable coatings as explained in the detailed description below.

In the method according to the invention, photoinitiator means an initiator adapted to initiate curing (for example crosslinking) of the curable coating when 5 activated by a specific electromagnetic energy.

The second photoinitiator may be introduced in the curable coating at any time before the product entering the activating enclosure in step (k). In one embodiment, it is introduced after the product has left the activating enclosure of step (h) i.e. after said first photoinitiator of the printing ink has been activated in 10 step (h). In such a case a liquid photoinitiator may be applied onto the surface of the curable coating.

In another embodiment, said second photoinitiator is introduced in the curable coating prior to step (h) i.e. before the product entering the activating enclosure in step (h). In this embodiment the second photoinitiator is selected 15 among those which are not sensitive to the normal activating conditions of said first photoinitiator, and the activating conditions prevailing in the activating enclosure of step (h) are so adapted as to specifically prevent activating said second photoinitiator. In this embodiment different ways are possible to select a convenient second photoinitiator.

20 In a first convenient way said second photoinitiator is selected among those having a sensitivity to an activating energy which is higher than the energy necessary to activate said first photoinitiator.

Another convenient way consists in selecting said first photoinitiator among those which are sensitive to a first range of electromagnetic radiation and 25 selecting a second photoinitiator which is sensitive to another range of electromagnetic radiation but not to said first range of electromagnetic radiation.

In a still further embodiment of the method according to the invention said second photoinitiator is selected among those having a migration time into said surface area of the curable coating greater than the migration time of said first 30 photoinitiator into said surface area of the curable coating.

In the embodiments just described the second photoinitiator may be introduced in the curable coating by any convenient means. A particularly convenient means consists in applying said second photoinitiator as a liquid onto the whole surface of the curable coating for example by brushing, painting or spraying.

5 Liquid solutions of said curable photoinitiator are especially preferred.

The activation of the photoinitiators in steps (h) and (k) is advantageously executed by means of electromagnetic radiations. Röntgen radiations are convenient. Ultra violet radiations (UV radiations) are preferred.

10 In a preferred embodiment of the method according to the invention it is preferred to select a curable coating, which is essentially free from any thermal curing or crosslinking initiator. More preferably, the curable coating is substantially free from any thermal curing or crosslinking initiator.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a flow diagram of a process of the invention.

15 FIG. 2 is a fragmentary sectional view through a product made according to the process illustrated in FIG. 1 prior to applying a curable coating over the gelled plastic layer. This view and those of FIGS. 3 and 4 are only for illustrative purposes and it is not intended that the thickness of the various layers of components shown are drawn to scale.

20 FIG. 3 is a fragmentary sectional view through a product made according to the process illustrated in FIG. 1 at the time of the first UV curing step (step h).

FIG. 4 is a fragmentary sectional view through a product made according to the process illustrated in FIG. 1 after the second UV curing step (step k).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 Referring to FIG. 1, a foamable plastic layer containing a foaming agent is applied over a sheet substrate. The combination is then heated to gel the plastic layer without activating the foaming agent. A first printing ink containing a first photoinitiator is then applied in a first pattern or design onto the gelled plastic layer

embodiments.

The Substrate

The substrate is a relatively flat, fibrous or non-fibrous, backing sheet material, such as a fibrous, felted or matted, relatively flat sheet of overlapping, intersecting fibers. The substrate can, if desired, comprise felts or papers, which are woven or non-woven. It can comprise knitted or otherwise fabricated textile material or fabrics made from cellulose, glass, natural or synthetic organic fibers, or natural or synthetic inorganic fibers, or supported or non-supported webs or sheets made therefrom, or filled or unfilled thermoplastic or thermoset polymeric materials. It can also comprise a compact or foamed layer. These and other substrate base materials are well known in the art and need not be further detailed here.

The Foamable Plastic Layer

The foamable plastic layer, when used, can be comprised of any suitable material known in the art for producing foamed plastic layers on a substrate, but is typically a polyvinylchloride ("PVC") plastisol, an organosol, a polyolefin, an ionomer, plasticized PVC or thermoplastic rubber. This layer can be pigmented or free of pigmentation. If the layer is pigmented, a color is preferably selected which is the average of the colors of the end product so that the appearance and aesthetics of the product are maintained during its working life. To one skilled in the art, the average color means the color perceived when one looks at a surface from a distance of more than about five feet (about 1.5 m).

The foamable plastic layer may include any of the various PVC resin materials normally used in connection with coating of decorative sheet materials and may specifically include, but are not limited to, those described in U.S. Patent No. 3,458,337. While a suitable foaming agent or blowing agent as taught by the above-mentioned patent may be used, a blend of azodicarbonamide ("ABFA") and p,p'oxybis (benzene sulfonyl hydrazide) ("OBSH") foaming agents can be used instead. Additional conventional ingredients such as stabilizers, foaming or blowing agent catalysts, etc. can be used, of course the catalyst is required if chemical inhibition is required. Although the preferred foamable plastic layer is a PVC homopolymer resin, other vinyl chloride resins can be employed. Other

synthetic resins are suitable such as polystyrene, substituted polystyrene (preferably wherein the substituents are selected from the group consisting of alkyl having 1-10 carbons, preferably 1-4 carbons, and aryl having 6-14 carbons), polyolefins such as polyethylene and polypropylene, acrylates and methacrylates, polyamide, 5 polyesters and any other natural or synthetic resin.

The composition of the foamable plastic layer must be compatible with the underlying substrate and the printing inks and, when gelled, must provide a smooth and uniform surface for the first and second printing inks. The composition also must be otherwise compatible with the overall product composition and, therefore, 10 within the principles of this invention. As indicated, it is not essential that a plastisol be used as the foamable plastic layer. Organosols and aqueous latexes are also of use, employing as the dispersing or suspending media, organic solvents and water, respectively, rather than plasticizers as in the case of a plastisol.

The foamable plastic layer is substantially uniformly applied in its liquid 15 state to the underlying substrate by conventional means such as a knife-over roll coater, direct roll coater, rotary screen, draw down bar, reverse roll coater or wire wound bar. The particular means for applying the foamable plastic layer does not relate to the essence of the invention, and any suitable coating means can be employed.

20 The thickness of the foamable, liquid plastic layer as it is applied to the underlying surface is substantially uniform and is in the range from about 2 to about 30 mils (about 50 to about 765 μm), preferably from about 6 to about 16 mils (about 150 to about 410 μm). The layer can be thicker or thinner as may be required by the particular product application.

25 Instead of a foamable plastic layer, a plastic layer which does not contain a foaming or blowing agent can be applied to the underlying substrate in the same manner as described above.

Gelling

30 After the foamable, liquid, plastic layer containing a foaming agent is applied over the substrate, the combination is heated for a period of time and at a temperature sufficient to gel the plastic layer, but not sufficient to activate or decom-

Claims

1. A method of making a surface covering which comprises the sequential steps of:

- a. applying a plastic layer over a substrate,
- 5 b. heating the plastic layer to a temperature which gels the plastic layer to form a gelled plastic layer having a surface,
- c. applying to the surface of the gelled plastic layer a first printing ink containing a first photoinitiator in a first pattern or a first design,
- 10 d. applying a first, non-curable coating made from a plastisol or organosol over the gelled plastic layer and first printing inks
- e. applying a second, curable coating over said first coating and optionally drying it,
- 15 f. gelling said second and optionally said first coatings,
- g. mechanically embossing the second, curable coating,
- h. activating said first photoinitiator and curing the surface areas of the second, curable coating disposed over the first printing ink,
- 20 i. heating the second, curable coating, the plastic layer and the substrate, wherein the mechanical embossing in areas that are not disposed over the first printing ink is relaxed,
- j. optionally mechanically embossing the second, curable coating in areas that are not disposed over the first printing ink
- k. curing the second, curable coating.

2. The method according to claim 1 wherein during step g), the first coating is also embossed.
3. The method according to claim 1, wherein the curable coating of step (e) comprises an urethane derived polymer.
- 5 4. The method of claim 3, wherein the curable coating of step (e) comprises polyurethane.
5. The method of claim 4, wherein the curable coating of step (e) essentially consists in polyurethane.
6. The method according to any of the claims 1 to 5 wherein after step h) of activating said first photoinitiator a liquid photoinitiator is applied onto the curable coating.
- 10 7. The method of any of claims 1 to 5, wherein :
 - said curable coating further comprises a thermal initiator
 - said thermal initiator is activated during step k).
- 15 8. The method according to any of the preceding claims wherein :
 - the plastic layer applied in step a) comprises a foaming agent,
 - the heating of step b) is performed without activating the foaming agent,
 - the first printing ink of step c) further contains an expansion inhibitor
 - the foaming agent is activated during step i).